

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

## PCT

To:

see form PCT/ISA/220

### WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/GB2004/002980

International filing date (day/month/year)  
09.07.2004

Priority date (day/month/year)  
12.07.2003

International Patent Classification (IPC) or both national classification and IPC  
G01T1/24

Applicant  
RADIATION WATCH LIMITED

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA:



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized Officer

Coda, R

Telephone No. +49 89 2399-2802



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/002980

---

**Box No. I Basis of the opinion**

---

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/002980

---

**Box No. II Priority**

---

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

4. Additional observations, if necessary:

---

**Box No. IV Lack of unity of invention**

---

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:

☐ paid additional fees.

☒ paid additional fees under protest.

☐ not paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

☐ complied with

☒ not complied with for the following reasons:

**see separate sheet**

4. Consequently, this report has been established in respect of the following parts of the international application:

☒ all parts.

☐ the parts relating to claims Nos.

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/002980

---

**Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

**1. Statement**

Novelty (N)	Yes: Claims	1-8, 11, 12, 21, 22, 25, 27-30
	No: Claims	9, 10, 13-20, 23, 24, 26, 31 - 52
Inventive step (IS)	Yes: Claims	1-8, 25, 27-30
	No: Claims	11, 12, 21, 22
Industrial applicability (IA)	Yes: Claims	1-52
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**Re Item IV.**

The International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims 1 to 33: an assembly and a method for monitoring ionising radiation having: a detector substrate for generating electronic charge in response to incident ionising radiation, the detector having an array of sense volumes; a circuit substrate supporting readout circuits corresponding to the sense volumes, each circuit being switchable between two charge integration modes, the first one arranged to sense a single ionising radiation event and the second one arranged to sense a plurality of ionising radiation events. Moreover the circuits have a photon counting circuitry responsive to events having first and second energy range.

2. Claims 34 to 52: a system and a method for remote monitoring of ionising radiation having at least one monitoring device including a communication unit for communicating the radiation data over a communication network and a control station to receive this radiation data. A possible hazardous radiation is detected by analysing the radiation spectroscopic data.

The common concept linking together the independent claims 1, 9, 10, 23, 27, 34 and 46 is the following:

*"An assembly for monitoring ionising radiation data".*

This common concept is not novel (see the document WO02/063339 A1, page 2, lines 16 to 23).

As it is apparent from the respective paragraphs of the present description, the two inventions are intended to solve the following problems:

Invention 1, claims 1 to 33: independent claims 1, 9, 10, 23 and 27 are directed towards an assembly and a method for monitoring ionising radiation having: a detector substrate for generating electronic charge in response to incident ionising radiation, the detector having an array of sense volumes; a circuit substrate supporting readout circuits corresponding to the sense volumes, each circuit being switchable between two charge integration modes, the first one arranged to sense a single ionising radiation event and the second one arranged to sense a plurality of ionising radiation events. The circuits have also a photon counting circuitry responsive to events having first and second energy range.  
*Problem:* to provide a device for monitoring ionising radiation with enhanced monitoring,

evaluation and analysis capabilities.

Invention 2, claims 34 to 52: independent claims 34 and 46 are directed towards a system and a method for remote monitoring of ionising radiation having at least one monitoring device including a communication unit for communicating the radiation data over a communication network and a control station to receive this radiation data. A possible hazardous radiation is detected by analysing the radiation spectroscopic data.

*Problem*: to provide a remote monitoring system able to promptly identify hazardous radiation and therefore avoiding false alarms.

The application lacks unity (Rule 13 PCT) because the above problems and solutions are independent of each other, i.e. they are not linked as to form a single general inventive concept (Rule 13.1 PCT). Moreover, the above inventions 1 and 2 share neither the same nor any corresponding special technical features defining a contribution over the prior art (Rule 13.2 PCT).

The applicants are informed that there will be no examination of the protest because the payment under protest was not accompanied by a reasoned statement contrary to the requirements of Rule 40.2.c PCT.

## **Re Item V.**

### Invention 1

1. The subject-matter of claims 9, 10, 13 to 20, 23, 24, 26 and 31 is not new (Art. 33(2) PCT).

1.1 With respect to independent claims 9 and 10, the document D1 (WO02/063339 A1) discloses an assembly for monitoring ionising radiation having: a detector substrate for generating electronic charge in response to incident ionising radiation, the detector having an array of sense volumes; a circuit substrate supporting readout circuits corresponding to the sense volumes (see page 10, lines 18; page 10, line 24 to page 11, line 10; page 11, lines 25 to 27; page 12, lines 9 to 14; figure 4(23)), wherein each readout circuit includes a photon counting circuitry responsive to events having first and second energy range and able to increment first and second counter respectively (see page 13, line 18 to page 14, line 12). The subject-matter of claims 9 and 10 is then not new.

- 1.2 It is noted that the document D2 (XP4251280) discloses and assembly according to claims 9 and 10 (see page 87, right column, lines 7 to 13; page 88, left column, lines 8, 21 to 2437, 38; page 88, right column, lines 18 to 37). Therefore also with respect to D2, the subject-matter of claims 9 and 10 is not new.
- 1.3 With respect to independent claim 23, the document D1 discloses a ionising radiation detector having a substrate crystal with a plurality of sense volumes, the crystal supporting a conductive material on a first surface and an array of conductive pads disposed on an opposed surface (see page 10, lines 25 to 28; page 11, line 21 to page 12, line 3; figure 4(23 to 25)). Therefore, the subject-matter of claim 23 is not new.
- 1.4 It is noted that the document D2 discloses and assembly according to claim 23 (see page 88, left column, line 8 to right column, line 27). Therefore also with respect to D2, the subject-matter of claim 23 is not new.
- 1.5 The dependent claims 13 to 20, 24, 26 and 31 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty, the reasons being as follows:
- claims 13 to 16, 18, 19, 24, 26, 31: the threshold circuitry and the semiconductors are disclosed by the documents D1 (see page 10, lines 24 to 28; page 11, lines 21 to 28; page 12, lines 1 to 6; page 13, lines 19 to 28; page 14, lines 1 to 12; page 16, lines 7 to 20; page 17, line 27 to page 18, line 1) and D2 (see page 87, right column, lines 1 to 6; page 88, left column, lines 8 to 13; page 88, right column, lines 34 to 36);
  - claims 17, 20: the document D1 discloses the bias signal (see page 12, lines 5, 6) and the document D2 discloses the CMOS (see page 87, right column, line 2).
2. The dependent claims 11, 12, 21 and 22 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), the reasons being as follows:
- claims 11, 12: the use of several detection period is a normal design procedure for the skilled person in order to improve the system reliability
  - claims 21, 22: this measurements selection is merely one of several straight-

forward possibilities from which the skilled person would select, without the exercise of inventive skill, in order to improve the system flexibility (see e.g. the document D3 - US5812191, column 21, lines 1 to 5).

3. Although claims 1, 9, 10, 23 and 27 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection. Hence, claims 1, 9, 10, 23 and 27 do not meet the requirements of Article 6 PCT.
4. Contrary to the requirements of Rule 6.2(a) PCT, claims 32 and 33 rely on reference to the drawings.
5. As far as claims 1 to 8, 25 and 27 to 30 are concerned, the following is noted:
  - 5.1 Technical Field  
Monitoring of ionising radiation.
  - 5.2 Novelty (Art. 33(2) PCT)  
None of the cited documents discloses readout circuits being switchable between two charge integration modes, the first one arranged to sense a single ionising radiation event and the second one arranged to sense a plurality of ionising radiation events. Therefore the subject-matter of claims 1 and 27 is novel (Article 33(2) PCT).
  - 5.3 Inventive Step (Art. 33(3) PCT)  
Document D1 (US-A-4 677 300) represents the closest prior art.  
This document discloses an assembly for monitoring ionising radiation having: a detector substrate for generating electronic charge in response to incident ionising radiation, the detector having an array of sense volumes; a circuit substrate supporting readout circuits corresponding to the sense volumes.  
Claim 1 is distinguished in that each readout circuit is switchable between two



charge integration modes, the first one arranged to sense a single ionising radiation event and the second one arranged to sense a plurality of ionising radiation events.

The problem to be solved by the present invention may therefore be regarded as how to provide a device for monitoring ionising radiation with enhanced monitoring, evaluation and analysis capabilities.

Since none of the cited documents hints at including a switch to select a charge integration mode, causing the advantage of improving the assembly monitoring, evaluation and analysis capabilities, claim 1 meets therefore the requirements of inventive step referred to in Art. 33(3) PCT.

It is noted that the independent method claim 27 corresponds to the independent apparatus claim 1 in that for every structural feature of claim 1 a corresponding method step is defined therein. Therefore also the independent claim 27 meets the requirements of inventive step referred to in Art. 33(3) PCT.

#### 5.4 Industrial Applicability

Without any doubts the application as defined in claims 1 to 8, 25 and 27 to 30 is industrially applicable.

#### 5.5 Dependent Claims

Claims 2 to 8 and 28 to 30 are dependent on claims 1 and 27 respectively and as such also meet the requirements of the PCT with respect to novelty and inventive step. It is also noted that the dependent claim 25 contains features which are already disclosed in claim 1. Therefore, in combination with the features of claim 23 to which it refers, it meets the requirements of the PCT in respect of novelty and inventive step.

### Invention 2

1. The subject-matter of claims 34 to 50 is not new (Art. 33(2) PCT).

1.1 With respect to independent claim 34, the document D5 (US2003/0069002 A1) discloses an ionising radiation monitoring network having: at least one ionising radiation monitoring device including a communications unit for communicating the radiation data over a communications network and a control station configured to receive the data (see page 7, paragraph [75]; page 10, paragraph [87]; figure 2). The subject-matter of claim 34 is then not new.

- 1.2 It is noted that the document D6 (US5986276) discloses an assembly according to claim 34 (see column 2, line 66 to column 3, line 5; column 4, lines 28 to 45). Therefore also with respect to D6, the subject-matter of claim 34 is not new.
- 1.3 It is noted that the document D7 (US6100806) discloses an assembly according to claim 34 (see column 6, lines 6 to 10; 33 to 47; column 8, lines 15 to 22; column 20, lines 18 to 30). Therefore also with respect to D7, the subject-matter of claim 34 is not new.
- 1.4 With respect to independent claim 46, the document D5 discloses a method of remote monitoring for ionising radiation comprising; receiving spectroscopic data from a remote ionising radiation sensor over a communications network and automatically determining from this data if the radiation is hazardous and issuing a warning signal (see page 11, paragraphs [98] and [101]; page 16, paragraph [137]; page 17, paragraph [140]). Therefore, the subject-matter of claim 46 is not new.
- 1.5 It is noted that the document D6 (US5986276) discloses a method according to claim 46 (see column 2, line 66 to column 3, line 5; column 4, lines 28 to 37, 46 to 55, 61 to 65; column 5, lines 63 to 67). Therefore also with respect to D6, the subject-matter of claim 46 is not new.
- 1.6 The dependent claims 35 to 45 and 47 to 50 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty, the reasons being as follows:
- claims 35, 42, 43, 50: spectroscopic data, the monitoring devices and the plume analysis are disclosed by the documents D5 (see page 11, paragraph [101]; page 10; paragraph [86]; page 14, paragraph [122]; page 16, paragraph [137]);
  - claims 36 to 41: these communications systems, the GPS and the portable device are disclosed by the documents D5 (see page 7, paragraphs [75], [76]; page 2, paragraph [16]; page 15, paragraph [133]; page 9, paragraph [82]);
  - claims 44, 45: the geographical display and the plots are disclosed by the documents D5 (see page 5, paragraph [53]; page 12, paragraph [110]);
  - claims 47 to 49: the warning and the voice commands are disclosed by the

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GB2004/002980

documents D5 (see page 16, paragraph [137]; page 7, paragraph [76]).

2. Contrary to the requirements of Rule 6.2(a) PCT, claims 51 and 52 rely on reference to the drawings.